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PARAMETER ESTIMATION FOR INFINITE MIXTURE MODELS

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Infinite mixture models (or general mixture densities) arise from the *compounding* of distributions. Two distributions are said to be compounded when one or more parameters of a given distribution are randomized according to a specified distribution. We discuss two approaches for the parameter estimation problem. The first approach approximates the compound distribution by a finite mixture model, while the second approach is a direct attack using the EM algorithm. The main complication in the latter approach is two-fold: 1. The E-step cannot be derived analytically and numerical integration is necessary; 2. The M-step requires a QN optimization. We will illustrate the two approaches with a specific example of a scale mixture of normal densities with a gamma mixing density. Known as the K-Bessel, this distribution has been used a model for low angle radar reflections from the sea surface. We will illustrate the theory by application to radar data.